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**Simon O'Hara, Assistant at Fota Island Golf Club, Cork, Ireland, was the winner of the Under 25 category of the BIGGA Essay Competition... for the second year in a row! The Irish literary tradition lives on.**

# Managing without Chemicals

We are fortunate to be living in a time of considerable scientific and ecological enlightenment, for in such an era surely we will prove that turf grasses can be successfully maintained without resorting to synthetic chemicals. It is becoming abundantly clear that legislation will increasingly limit the use of chemicals so we must therefore concentrate our energies on finding alternative solutions.

The prospect of managing a turf grass environment without utilising chemicals may one day be tenable. The advances being made in researching maintenance practises, developing resistant grass cultivars and exploring biological alternatives to synthetic chemicals may soon enable us to adopt chemical free maintenance practises.

The task of managing golf courses without resorting to chemical solutions is a path that many of today's most progressive managers are beginning to tread. There are a number of sound reasons for this strategy, principally the European Union's increasing restrictions on pesticide usage, growing environmental awareness, inherent risks to personal health along with the financial costs combine to instil on us the need to seek alternatives where ever possible.

Through the examination of the most prevalent problems to affect our turf grass environment we may be able to explore non-chemical alternatives. The most frequent attacks, normally dealt with by chemicals, that are ravaged on turf grasses include worm casting along with invasion by animals, pests, weeds and pathogens. These common concerns may yet be controlled by non-chemical means. While many potential solutions may be too expensive or time consuming to implement, they may nevertheless prove themselves in the long term.

**We are certain to see the continued use and development of chemicals within our industry, used sympathetically in conjunction with cultural and biological practises, they will provide us with the necessary tools to produce perfect playing surfaces**

Worm casting can leave even the most beautifully manicured courses horrendously muddled. Restrictions on the use of chemical controls have led us to explore various alternatives. One method that has been suggested would be the incorporation of a layer of sharp angular gravel, coarse sand or even broken glass beneath the rootzone, very much like the construction of USGA specification greens. Obviously this would be a costly operation, feasible really only during construction, however the benefits over time may yet make this a prudent alternative, especially with the added drainage benefits which could prove effective as our climate gets wetter and as golfers demand perfect year round amusement. Such barriers to surface earthworm activity have previously met with considerable success.

The persistent problem of animal activity on the golf course has been shown to be effectively managed without resort to chemicals. A great deal of damage can be wrought by many bird and animal species as they seek a tasty subsurface meal. Whilst it is plausible to use a shotgun to prevent damage, several more novel ideas are beginning to appear which reduce turf grass disruption without

wildlife injury. The use of trained dogs on the golf course to chase away individual species of animals and birds that have been identified with specific damage has been initiated and would appear to be both environmentally sound as well as cost effective. The use of lion dung, at spaced intervals, has been successfully employed in the United States to discourage deer activity in those specific areas. It would be lovely to think that we could solve all our problems in such environmentally sound and novel ways.

The problem of pathogenic infestation on fine turf grasses is always a worry. This is perhaps the most noticeable arena in which there has been very little option once an area has been infected than to seek chemical assistance. However, recent developments suggest that natural biological alternatives may offer similar success. The discovery that a compound from Peach Oil may be a suitable substitution for synthetic compounds such as methyl bromide. It has been found that the peach essence kills *Fusarium oxysporum*, *Pythium aphanidermatum* along with various other soil pathogens, which lead scientists to believe that it may be a very suitable fungicide. Equally important though was that this peach oil was found to favour beneficial organisms in that soil.

In the context of natural chemicals another excellent alternative may come from the world's coral reefs. Australian scientists appear to have isolated a group of compounds that disable an enzyme that is specific to the photosynthesis of most weed plants and yet have no negative effect on grass plants. Research like this will undoubtedly provide genuine encouragement in the bid to provide a synthetic chemical free maintenance regime for the turf grass environment.

It is hoped that scientists will be able to provide similar organic based compounds to deal with turf grass pests such as leatherjackets. The control of pests of this nature will no doubt provide a real challenge. Novel suggestions have included the use of scarab beetles, parasitic flies, colonies of Bats or even the introduction of predatory non-indigenous organisms may also prove effective. While these may appear fanciful, it may nevertheless be concepts such as these that may yield success. The introduction

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of the mechanical devices, already in standard use, to apply both water and air under high pressure directly into the soil, may also help to control such pests. At present however it is clear that the controlled use of chemicals is without question the most effective method of dealing with the previously mentioned turf grass dilemmas.

Whatever alternatives there may be to chemicals, there are no alternatives to good greenkeeping practise. There can be no substitute for maintaining turf grasses in their healthiest state. Good cultural practises contribute significantly to reduce the threat of pathogen, weed or pest invasions. The employment of appropriate seed and seed bed sanitation will provide the purest crop. The planting of disease-resistant species and cultivars is essential.

Once established then maintenance practices must be used that promotes the health of the plant particularly at times of potential pathogen or pest ingress. Therein the use of sound cultural practises is vital. There can be no substitute for encouraging better percolation and infiltration as well as a reduction in thatch. Neither can we fail to maintain turf grasses at their optimum heights and with appropriate fertiliser levels to ensure greater

health whilst also ensuring regular dew removal. Similarly keeping cutting reels perfectly sharp and even to ensure minimal plant injury and stress. All of these factors not only contribute to reducing the incidence of disease, but also ensuring that the golf course is presented in the best possible fashion.

The continuation and extension of funding, with regard to alternative as well as conventional scientific research into matters relevant to the turf grass environment, is essential if we are to progress towards a chemical free approach. New research at present has had encouraging results with the use of beneficial soil microbes which greatly contribute to the health of the grass plant. This has undoubtedly become one of the focal areas of current work with positive results regarding plant uptake of nutrients, better seedling establishment, disease resistance and reduced poa annua growth.

Similarly, new developments in the creation of new grass cultivars will continue to be an important focal area as scientists attempt to create new super grasses. Standard cross breeding procedures are likely to be allied with genetic engineering in future years providing we can reconcile our moral dilemmas about tampering with nature. With such tools at our disposal we may see the creation of greens quality grasses that contain compounds that can repel pathogens and pests.

It is becoming apparent that if current research continues there will be significant changes in our industry within that next few decades. If we analyse developments as they have happened during the last fifty years, we can see that every new year has brought a greater number of changes than the last. This trend will continue, as it does in all scientific fields, to provide increasing research that may yet lead to the possibility of a chemical free future for the turf grass manager.

We must however be wary of overconfidence for despite fantastic scientific breakthroughs, there is very little evidence to suggest that we may ever master the turf grass environment without the use of synthetic chemicals. Whether the fungicides that we are creating are natural or not, and regardless of our advances in developing increasingly resistant grasses, neither of these strategies have previously offered a permanent solution to turf grass ailments. Most

plant pathogens have proved themselves able to mutate very rapidly to become resistant to all but the most toxic of fungicides, similarly pathogens are very adaptable at disguising themselves so that they become unrecognisable to plants carrying genes with previously resistant characteristics. We have just cause for concern that any of our new developments will share a similar fate as pathogens continue to prove their adaptability.

It would seem that on present evidence, although there may be some very interesting developments, we must conclude that the controlled use of chemicals will undoubtedly continue to be a very important part of greenkeeping. Most superintendents have adopted the sensible approach by combining cultural, chemical and biological practises as their management policy. This integrated management concept has proved itself most successful and we can be justified in advocating it. While we may be on the verge of a new era, we should undoubtedly stick to the tried and trusted. This though is not to say that we should forever forsake new ideas, rather that these ideas, particularly if they are at the cutting edge, should be thoroughly investigated before adoption.

It appears likely therefore that we must reconcile our desires for a chemical free environment against their proven effectiveness. Nevertheless we should encourage any proven approaches to turf grass management that do not require chemical applications. Good cultural practises are vital to keep the turf grass environment at a healthy advantage over potential pathogenic invasion. Therein the probiotic approach has thus far shown promising results by inoculating the sward to counter turf diseases essentially by promoting healthy growth. No doubt the combination of these two operations will form the cornerstone of future management practises. Continued investment in research projects will assuredly provide many new and exciting possibilities that may forever change work practises within our profession. However irrespective of such hypotheses we are certain to see the continued use and development of chemicals within our industry, used sympathetically in conjunction with cultural and biological practises, they will provide us with the necessary tools to produce perfect playing surfaces.